

Care and Maintenance of Ge Array Detectors

General:

Ge Array detectors are very complex and delicate instruments that require proper care and maintenance to obtain reliable long-term performance. Below you will find suggestions for the proper care and maintenance of Array detectors.

Detector Storage:

Ge Array detectors are capable of being warmed up and stored at room temperature. We have found, however, the performance of these detectors is best preserved by keeping them cold. Short warm up periods will not affect detector performance, but extended periods of time at room temperature can cause subtle changes in the electrical characteristics of the detector that will ultimately affect the energy resolution and operating characteristics of the array.

Therefore, we strongly recommend that this detector be cooled down and kept at liquid nitrogen temperature from the time that it is received.

Operating and Storage Environment:

The detector should be used and stored in a clean, dry environment free of any unusual levels of light gases such as helium that can diffuse through vacuum seals spoiling the cryostat vacuum.

Ion Pumps:

Some Ge Array detectors are equipped with ion pumps. These pumps are intended to assist maintaining cryostat vacuum. We recommend that the ion pump be turned on only periodically to monitor and to maintain cryostat vacuum.

However, it is essential that the ion pump never be energized when the detector is cooling down, warming up, or at room temperature. Failure to disable the ion pump during any of these conditions will damage the detector elements. Damage to the array caused by ion pump sputtering from improper use is not covered by warranty.

Be Cryostat Window:

Thin beryllium windows can be damaged easily. Windows of 0.25 mm (10 mils) thickness, or less, should not be touched. The window can be damaged by moisture condensation, so keep the window clean and dry at all times.

The detector should not be stored or operated in a humid environment. If moisture condenses on the Be window during normal operation, either the humidity is too high or the detector may have a vacuum problem.

During cool-down or warm-up cycles when the molecular sieves outgas, some condensation may appear. This is normal. It should go away as soon as the molecular sieves re-pump the system.

WARNING

For detectors used inside a vacuum system additional care is required. Thin beryllium cryostat windows can easily be damaged by in-rushing debris when back-filling the sample chamber. Therefore, it is important that the sample chamber be clean and free of any loose particulate matter. The sample chamber should also be slowly back filled to atmosphere using filtered dry nitrogen gas or equivalent clean gas conducive for safe operation of the detector and cryostat window.

It is equally important to have the detector full of liquid nitrogen and cold any time the sample chamber is under vacuum. This is important to equalize the pressure on both sides of the cryostat window. Never allow the detector to warm-up to room temperature when the sample chamber is under vacuum; else risk damage to the beryllium cryostat window.

Some cryostats are equipped with a vacuum bypass valve. This valve must be in the open position anytime the detector is moved to the park/retracted position and stored behind a closed gate valve.

NOTE: Damage to Be windows caused by physical abuse or harsh environments is not covered by the warranty.

High Voltage and Preamplifier Power:

Never apply high voltage or preamplifier power until the Array detector has cooled down for the proper time period specified on the detector serial number tag and specification sheet. High voltage and preamplifier power should always be turned off any time that the Array detector is not in use. Also, never allow the Array detector to warm-up to room temperature with high voltage or preamplifier power applied.

Premature application of high voltage and preamplifier power will cause damage to the Array detector. Likewise, failure to disable high voltage and preamplifier power during warm-up to room temperature will also cause damage to the Array.

Filling With Liquid Nitrogen:

The Array detector should be filled from a suitable source of liquid nitrogen that is free from debris and ice crystals. When using a pressurized source of liquid nitrogen the supply pressure should never exceed 25 psig. Over flow of liquid nitrogen and cold nitrogen gas must be diverted away from the cryostat to avoid freezing of the cryostat vacuum seal that will otherwise cause a cryostat vacuum problem.

Please feel free to contact Canberra Detector Products Division should you have any questions regarding the proper care and maintenance of your Array detector.